

Constructors Discuss Pollution and Bridge Deck Deterioration

Discussion Summary by

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[Editor's Note—Indiana Highway Constructors and the ISHC Divisions of Construction, Design, Planning, and Materials and Tests held a joint session and panel discussion on pollution and bridge deck deterioration. Prof. H. L. Michael, Purdue University, was moderator and the panel consisted of W. J. Ritman, Assistant Engineer of Construction, ISHC; Robert Conwell, Engineer, Tri-Angle Construction Co., Inc.; Dewey Hauser, General Superintendent, R. L. Schutt Co., Inc.; and Ames.]

CONSTRUCTION AND POLLUTION

The major point of agreement on this subject was a general acceptance of the principle that there were things that should be controlled in our construction to reduce stream and air pollution. There are still questions to resolve about exactly what we want to do.

Burning Permits Tight

One of the things of greatest concern to the contractor is burning of cleared material. They are most anxious to know, before bidding, whether burning will be permitted or denied. The Board of Health has made it clear to us they will issue permits for burning only in what they consider to be hardship cases.

Since the air pollution control board meets only once every two months, it frequently takes considerable time to secure a definite answer to various requests. The contractors still wish to make these requests and they have suggested that alternate bids for the clearing item be taken. We have not found the alternate bid acceptable because of the way the alternate was applied might change the low bidder.

Use of Wood Mulching Machines

Cleared wood has been disposed of by chipping it and using it as mulch. Widely varied estimates of the quantity of mulch which would be produced were made. Widely divergent costs of chipping machines were quoted. Jay W. Miller stated that the wood pieces could be left large enough so that washing away would not be a problem. Cooper

advised that the landscape department was working on plans and specifications whereby the timber would be chipped and the chips used for mulching. This will possibly be included in a future contract.

Forced Air Burning Equipment

McDonald asked about forced air burning equipment. To this Williams responded that the Board for Air Pollution Control had authority to approve such equipment. It has been noted that this type of burning is cleaner than ordinary burning. However, they consider the equipment to be in the experimental stage and no blanket approval has been made.

Williams also stated that burning of used tires was never acceptable.

Clearing by Specialists

A suggestion was made that clearing might be done by a separate contract prior to letting the general road construction contract. This suggestion received generally favorable comments. This would permit specialists to use expensive chipping equipment and make the most of merchantable timber. It should also be noted that this might leave more acres exposed to erosion for a longer time.

Erosion Control by Temporary Seeding

One of the principal erosion control topics was temporary seeding. It is the intent of our present contracts that temporary seeding be done on fill slopes and cutback slopes as soon as practical after grading operations are completed. The temporary seed mixture specified should be used for this early seeding. The contractor also must bid on an item of water which may be required on the temporary seeding.

The permanent seed mixture is the same as the temporary mixture except that the former has five pounds less annual Ryegrass seed and five pounds more Fescue seed. This mixture is to be used to seed any areas which could not be covered with temporary seed and any areas of the temporary seed that were damaged by causes other than negligence of the contractor.

Other Methods for Control of Erosion and Water Pollution

Some of the other methods mentioned to control water pollution were:

1. Limit denuded surface.
2. Use silting basins.
3. Reseed borrow pits.
4. Water haul roads.
5. Use non-erosive cofferdams.

BRIDGE DECK DETERIORATION

In recent years one of the greatest problems facing the Indiana State Highway Commission has been the rapid deterioration of concrete bridge decks. The causes of this deterioration appears to be multiple and interrelated. They include increased use of de-icing salts, insufficient cover and rusting of deck reinforcing steel, non-durable concrete, etc. Keeping this in mind, the following topics were discussed:

Stay-In-Place Steel Bridge Deck Forms

Several requests have been made to use Stay-In-Place (SIP) steel bridge deck forms. Should they be used?

It was noted that the 1969 standard specifications do not permit the use of SIP forms, but if a 20-cent per square foot reduction was offered by the contractor, their use would be considered.

Cox, a supplier, asked that SIP forms be included in the specification as a bidding alternate. He was advised that the Federal Highway Administration (FHWA) would not approve this procedure.

Miller of the FHWA stated that the use of SIP forms should be an engineering decision and that certain select projects could specify the use of said forms during the design phase.

Ritman noted that SIP forms were used on some jobs in the early 1960's. Some problems are evident, especially when used below a joint.

Some Causes of Deck Deterioration

Hauser discussed his findings concerning deterioration of bridge decks. He stated that most decks that fail early seem to be on bridges designed with steel girders. He then asked for a discussion from other contractors.

Bartlett stated that too little concrete cover probably caused most early deterioration and that increased over to two inches should lessen the problem. He also noted that low slump concrete, $2\frac{1}{2}$ inches or less, caused problems in obtaining concrete density.

Several persons in attendance expressed the thought that our present steel girder bridges were being designed with beams that deflected excessively.

Richardson stated that a research project was now in planning to construct a bridge that was designed on the basis of stress rather than deflection thus allowing more deflection.

Use of Low Slump Concrete

Ritman stated that a recent PCA report suggests that deck concrete should have a slump of $2\frac{1}{2}$, plus or minus $\frac{1}{2}$ inches. He asked if

concrete could be satisfactorily placed at this slump with the present equipment.

Most contractors agreed that concrete could be satisfactorily placed at $2\frac{1}{2}$ inches slump if weather conditions were ideal. They also noted that a range up to 4 inches slump should be allowed for hot summer days. Low slump concrete tends to cause honeycomb at the bottom of the deck especially with the increased amount of deck reinforcing steel now used.

Pick Ideal Weather for Pouring

Ritman asked if seasonal or other limits such as ambient temperatures, humidity, and/or wind velocity should be used to establish the proper time to pour a bridge deck.

Most contractors stated that they tried to pick the best days to pour a bridge deck especially during the winter months. They stressed in order to keep qualified personnel they must be employed during both winter and summer.

Operation of Finish Machines

Ritman asked if finish machines should be operated square or on the skew.

Earl stated that he has a rule of thumb that all decks will be poured on the skew if the angle is 10° or more. He noted that the structural steel would be loaded more uniformly by this procedure.

Ritman stated that skewed pouring was a must on bridges that are designed with hinge joints in the girders and involving excessive dead load deflection.

Some contractors stated that they preferred to pour on the skew but pointed out that skewed pouring causes the finish machine to be lengthened.

Length of Deck Finish Machines

Ritman asked if we should limit the length of deck finishing machines. Schutt stated that he has poured decks where the finish machine was spanning 60 feet and that other states have used the Bidwell finisher up to 72 feet. He noted that he has load tested a Bidwell at long spans and has the data available in the office.

Most contractors opposed any arbitrary limit being placed on the length of deck finish machines.